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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/634,971	08/05/2003	Kouji Ikeda	5077-000179	6957
27572	7590	12/27/2004	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C.			DUDDING, ALFRED E	
P.O. BOX 828			ART UNIT	
BLOOMFIELD HILLS, MI 48303			PAPER NUMBER	
			2853	

DATE MAILED: 12/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/634,971

Applicant(s)

IKEDA ET AL.

Examiner

Alfred E. Dudding

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7, 10, 13, 16, 19, 20, 22, 25, 28, 31, 34 and 37 is/are allowed.
- 6) ☒ Claim(s) 1-6, 8, 9, 14, 15, 32, 33, 35 and 36 is/are rejected.
- 7) ☒ Claim(s) 11, 12, 17, 18, 21, 23, 24, 26, 27, 29 and 30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

a. reference characters 31c, 31d, 31e, 31f, and 31g are not found in the drawings. These reference characters are cited in the specification on the following pages and lines:

i. page 28, lines 11 and 24

ii. page 29, lines 5, 7, and 8

iv. page 30, lines 6 and 8

iv. page 31, line 13

v. page 32, lines 14 and 15

vi. page 34, lines 9, 12, 25, and 26

vii. page 36, lines 1 and 3

viii. page 38, lines 2 and 5

ix. page 39, line 11page 41, line 7

x. page 43, lines 2, 11, and 17

xi. page 47, lines 9 and 19

xii. page 48, lines 9, 10, and 15

xiii. page 49, line 14

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the

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examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

3. Claims 1, 5, and 35 are rejected under 35 U.S.C. 102(a) as being anticipated by Ozaki et al. (U.S. 6,761,423 B2).

Ozaki et al. disclose an ink jet recording apparatus, Figure 3, element 100, comprising a head assembly section provided with a plurality of nozzles and a plurality of pressure chambers storing ink therein, Figure 1, element 20 (nozzles), element 19 (pressure chambers), and communicated respectively to the nozzles, Column 6, lines 19 – 26, a plurality of pressure application means for applying a pressure on the ink in the respective pressure chambers so as to discharge ink droplets through the nozzles onto a recording medium, Figure 1, elements 16a, 16b (piezoelectric elements), and driving pulse supply means for supplying, to the pressure application means, a driving pulse for driving the pressure application means, Figure 2, element 50(MPU), Column 7, lines 11 – 27); wherein the nozzles include at least a first nozzle and a second nozzle that are arranged in a direction perpendicular to a relative movement direction in which the head assembly section is relatively moved with respect to the recording medium while discharging ink; Figure 3, element 10 (ink jet recording head) is arranged to scan in the “X” direction, the nozzles being arranged in a direction perpendicular to the medium; and the driving pulse supply means selectively supplies a first driving pulse and a second driving pulse, the first driving pulse including a preliminary pulse for vibrating an ink meniscus in a tip portion of the nozzle and a discharge pulse for

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discharging an ink droplet through the nozzle in this order, and the second driving pulse including the discharge pulse, wherein the first driving pulse is supplied to the pressure application means corresponding to the first nozzle while the second driving pulse is supplied to the pressure application means corresponding to the second nozzle, Columns 24 – 25, claim 1.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 2, 3, 9, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. in view of Saruta (U.S. 5,980,015 A).

Ozaki et al. teaches all of the limitations of the claimed invention except for the first driving pulse is supplied to the pressure application means corresponding at least one of the plurality of nozzles in a predetermined printing period while the second driving pulse is supplied thereto in a printing period different from the predetermined printing period; and that the ink jet recording apparatus further comprises reference pulse generation means for generating a reference pulse including a first reference pulse and a second reference pulse, the first reference pulse including the preliminary pulse

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and the discharge pulse in this order, and the second reference pulse including the discharge pulse; and the driving pulse supply means supplies, to the pressure application means, the reference pulse generated by the reference pulse generation means as the driving pulse and that a waveform of the discharge pulse of the first reference pulse and that of the discharge pulse of the second reference pulse are different from each other.

Saruta discloses the ink jet recording apparatus further comprises reference pulse generation means for generating a reference pulse including a first reference pulse and a second reference pulse, Figure 4, "OUT" waveform, the first reference pulse including the preliminary pulse and the discharge pulse in this order, Figure 6(a); and the second reference pulse including the discharge pulse; and the driving pulse supply means supplies to the pressure application means, the reference pulse generated by the reference pulse generation means as the driving pulse, Figure 2, element 23 (drive signal generating circuit), element 6, (piezoelectric elements); and that a waveform of the discharge pulse of the first reference pulse and that of the discharge pulse of the second reference pulse are different from each other, Figure 6(a), clearly seen.

Saruta discloses that the first driving pulse is supplied to the pressure application means corresponding at least one of the plurality of nozzles in a predetermined printing period while the second driving pulse is supplied thereto in a printing period different from the predetermined printing period, Figure 6(b), clearly seen.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the waveform of Saruta in the ink jet recording apparatus of Ozaki et al. in order to prevent clogging of unused nozzles during printing.

7. Claim 4, 6, 8, 14, 15, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. in view of Saruta and further in view of Momose et al. (U.S. 6,460,959 B1).

The combination of Ozaki et al. and Saruta teach all of the limitations of the claimed invention except where the driving pulse supply means supplies at least three first driving pulses, including a

preliminary pulse and a first and second driving pulses, an interval between the first one of the first driving pulses and the second one of the first driving pulses is different from that between the second one of the first driving pulses and the third one of the first driving pulses or interval between a start of the preliminary pulse and a start of the discharge pulse in the first driving pulse is less than or equal to twice a Helmholtz period of the head assembly section; and the ink jet recording apparatus further comprises reference pulse generation means for generating a reference pulse for driving the pressure application means; the reference pulse includes the preliminary pulse and the discharge pulse; and the driving pulse supply means produces one of the first and second driving pulses from the preliminary pulse and the discharge pulse generated by the reference pulse generation means, and supplies the produced pulse to the pressure application means.

Momose et al. disclose a the driving pulse supply means supplies at least three first driving pulses, including a preliminary pulse, Figure 7, element 13, first driving pulse, element 14, second driving pulse, element 15; an interval between the first one of the first driving pulses and the second one of the first driving pulses is different from that between the second one of the first driving pulses and the third one of the first driving pulses, Figure 3(e), clearly seen and that an interval between a start of the preliminary pulse and a start of the discharge pulse in the first driving pulse is less than or equal to twice a Helmholtz period of the head assembly section, Column 2 8 – 17 (N = 3 as a minimum, the period is 1.5 times a Helmholtz period). Momose et al. teach that the ink jet recording apparatus further comprises reference pulse generation means for generating a reference pulse for driving the pressure application means; the reference pulse includes the preliminary pulse and the discharge pulse; and the driving pulse supply means produces one of the first and second driving pulses from the preliminary pulse and the discharge pulse generated by the reference pulse generation means, and supplies the produced pulse to the pressure application means, Figure 6, reference signal (COM), preliminary pulse (13), selection of pulses, clearly seen.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the waveform and timing intervals of Momose et al. in the ink jet recording apparatus of Ozaki et al. and Saruta in order to perform gradation and prevent ink clogging.

Allowable Subject Matter

8. Claims 7, 10, 13, 16, 19, 20, 22, 25, 28, 31, 34, and 37 are allowed.

9. The following is a statement of reasons for the indication of allowable subject matter:

a. The primary reason for the allowance of claims 7, 10, 13, 16, 19, 20, 22, 25, 28, 31, 34, and 37 is the inclusion of the combination of the limitations of an ink jet recording apparatus, wherein the same driving pulse is supplied to the pressure application means corresponding to the first nozzle and to the pressure application means corresponding to the second nozzle, an ink droplet discharged through the second nozzle forms an ink dot whose diameter is a predetermined reference diameter and whose landing position is a reference landing position on the recording medium, while an ink droplet discharged through the first nozzle forms an ink dot whose diameter is different from the predetermined reference diameter and/or whose landing position is shifted from the reference landing position; and the driving pulse supply means selectively supplies a first driving pulse and a second driving pulse, the first driving pulse including a preliminary pulse for vibrating an ink meniscus in a tip portion of the nozzle and a discharge pulse for discharging an ink droplet through the nozzle in this order, and the second driving pulse including the discharge pulse, wherein the first driving pulse is supplied to the pressure application means corresponding to the first nozzle while the second driving pulse is supplied to the pressure application means corresponding to the second nozzle. It is these limitations found in each of the claims, as it is claimed in the combination, that has not been found, taught, or suggested by the prior art of record which makes these claims allowable over the prior art.

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8. Claims 11, 12, 17, 18, 21, 23, 24, 26, 27, 29, and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

a. A search of prior art did not cite a preliminary pulse having an amplitude equal to that of the discharge pulse, and a pulse width of the preliminary pulse is $1/40$ to $1/5$ of a Helmholtz period of the head assembly section as claimed in the limitations of claims 11 and 12.

b. A search of prior art did not cite an ink jet recording apparatus wherein a landing position of a first ink dot that is formed by supplying the second driving pulse to the pressure application means and that of a second ink dot that is formed by supplying the first driving pulse to the pressure application means are different from each other with respect to the direction perpendicular to the relative movement direction as claimed in the limitations of claims 17, 18, 21, 23, 24, 26, 27, 29, and 30.

Information Disclosure Statement

10. The Information Disclosure Statement filed 5 August 2003 was not received (PTO form 1449 or equivalent). The following foreign references submitted with the application were considered by the examiner:

a. Murakami et al., JP - 59 176055A, 5/10/84

b. Nakano et al. , JP-04 339660A, 11/26/1992

c. Maruyama, JP-55 090373 A, 7/8/1980

d. Hosono, JP-11 277 744A, 12/10/1999

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Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

a. Hawkins et al. (U.S. 6,508, 532 B1) disclose an ink jet recording apparatus wherein a cross section, perpendicular to the relative movement section, of the ink meniscus in the tip portion of the nozzle corresponding to the pressure application means is asymmetric about an axis of the nozzle, Figure 2b, clearly seen. Hawkins et al. fail to teach the claimed invention of a driving pulse supply means selectively supplies a first driving pulse and a second driving pulse, the first driving pulse including a preliminary pulse for vibrating an ink meniscus in a tip portion of the nozzle and a, discharge pulse for discharging an ink droplet through the nozzle in this order, and the second driving pulse including the discharge pulse, wherein the first driving pulse is supplied to the pressure application means corresponding to the first nozzle while the second driving pulse is supplied to the pressure application means corresponding to the second nozzle.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alfred Dudding whose telephone number is (571) 272-2144. The examiner can normally be reached on Monday-Friday from 7:00 AM to 3:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier, AU 2853, can be reached at (571) 272 - 2149. The fax phone number for this Group is are (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist whose telephone number is (703) 308-0956.


Stephen D. Meier
Primary Examiner

Alfred Dudding


20 December 2004